

REMARKS

1. Status of Claims

Claims 1, 3-11, and 14-18 remain for consideration. Claims 1 and 14-17 have been amended. No new matter is introduced by the claim amendments.

2. Response to Claim Objections

The Examiner objects to claims 1 and 16 for the incorrect chemical formula. The Examiner also objects to claims 14 and 15 for their depending from cancelled claim 12. Applicants thank the Examiner for his pointing out these typos and have corrected them accordingly.

3. Response to Obviousness Rejection

Claims 1, 3-11, and 14-18 are rejected as being obvious over the U.S. Pat. No. 5,475,073 (*Guo*) in view of U.S. Pat. No. 6,127,500 (*Guo et al.*), and further in view of *Aldrich* catalog. Applicants respectfully urge that the Examiner reconsider and withdraw the obviousness rejection for the reason that follows.

A) The Examiner's Obviousness Analysis

According to the Examiner, *Guo* teaches a process for making an acrylic polyol wherein an allylic alcohol or propoxylated allylic alcohol and a C₁ to C₂₀ alkyl or aryl acrylate or methacrylate are free radically copolymerized, wherein the reaction temperature is generally from 60°C to 300°C; wherein the all or some of the acrylic monomer(s) and the initiator are gradually added during the course of the polymerization; wherein the preferred propoxylated allylic alcohol includes mono- or di-propoxylated allylic alcohol; and wherein the acrylic polyol has a number average molecular weight of 1560 and a weight average molecular weight of 4800, which constitutes a molecular weight distribution of 3.07, and a hydroxyl number of 120 mg KOH/g. *See the Office Action of July 11, 2003, from the last paragraph of page 3 which continues over to page 4.*

The Examiner admits the following defects of *Guo*: (1) heating the reactor contents to reflux; (2) the free radical initiator containing less than 30 wt% of water; (3) total

monomer conversion of greater than 90%; and (4) acrylic polyols having a molecular weight distribution less than about 2.5. *See page 4 of the Office action.*

The Examiner contends

- (1) Since *Guo* teaches a process for preparing acrylic polyols from allylic alcohols and acrylic monomers, under conditions which anticipate or encompass the present reaction conditions (e.g., the reaction temperature up to 300°C, type and amount of monomer used, type of initiator, etc.), it would be reasonable for one of ordinary skill in the art to expect and realize that the heating of the reactor contents to reflux, obtaining a total monomer conversion of greater than 90%, and producing acrylic polyols having a molecular weight distribution less than about 2.5; and
- (2) Di-t-butyl peroxide is used as the free radical initiator in Example 3 of *Guo*, which is a commercially available solution that contains less than 30% of water.

To further remedy the deficiency in *Guo*, the Examiner cites *Guo et al.* for its teachings that the acrylic polyols made in *Guo* have low molecular weights and molecular weight distributions less than 3 and that the acrylic polyols disclosed in *Guo* are valuable reactive intermediates for making high-performance coatings and other thermoset polymers. The Examiner therefore concludes: "It would have been *prima facie* obvious to one having ordinary skill in the art, in view of the *Guo* and *Guo et al.* references, to prepare acrylic polyols as presently claimed."

B) Applicants' Response to the Obviousness Rejection

Applicants contend that there is no *prima facie* case of obviousness for the present claims over *Guo* in view of *Guo et al.* and further in view of *Aldrich* catalog according to MPEP §2142. MPEP §2142 provides

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there

must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.”

Applicants urge that the Examiner withdraw the obviousness rejection because none of these three requirements provided by MPEP §2142 is satisfied by the Examiner’s rejection.

(I) Suggestion or Motivation to Modify the References

As discussed in section A), the Examiner has two essential contentions. First, the Examiner contends: since *Guo* teaches a process for preparing acrylic polyols which encompasses the process conditions of the present invention (e.g., the reaction temperature, type and amount of monomer used, type of initiator, etc.), a reasonable artisan will be motivated by *Guo* to make the present invention. Second, the Examiner contends: even if *Guo* itself is not enough to motivate a reasonable artisan to make the present invention, *Guo et al.* teaches that the acrylic polyols made in *Guo* are valuable materials, and this teaching will motivate a reasonable artisan to modify the *Guo* process. These arguments are inconsistent with MPEP §2143.01 and therefore they must fail.

MPEP §2143.01 instructs that “A statement that modifications of the prior art to meet the claimed invention would have been " 'well within the ordinary skill of the art at the time the claimed invention was made' " because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references.”

According to the Examiner, because *Guo* teaches a process for making acrylic polyols, a reasonable artisan will be motivated by *Guo* to conduct the polymerization in the absence of styrene, methyl acrylate (or methacrylate), and allyl alcohol in order to increase the monomer conversion regardless of the fact that *Guo* specifically teaches the use of these monomers. According to the Examiner, because *Guo* teaches that the reaction temperature can be up to 300°C, a reasonable artisan will be motivated to conduct the reaction at a reflux condition. According to the Examiner, because *Guo*’s material is valuable, any improvement of the material would be obvious. Following the Examiner’s

reasoning, no inventions after *Guo* in the area of making acrylic polyols from allylic monomers would be possibly patentable. The Examiner's argument is apparently inconsistent with the notion of MPEP §2143.01.

According to the instruction of MPEP §2143.01, the Examiner must provide some objective reason to modify the teachings of the references. The Examiner has failed to do so. Thus, Applicants respectfully request that the Examiner withdraw the rejection.

(II) Reasonable Expectation of Success

Applicants urge that the Examiner withdraw the obviousness rejection also because the Examiner fails to satisfy the second requirement of MPEP §2142: the combined teachings of the references must provide a reasonable expectation of success.

As Applicants discussed in the Background of the Invention, making acrylic polyols from allylic monomers is difficult because of low monomer conversion. Removing and recycling unreacted monomers is inconvenient and costly. *See the application, page 2, lines 16-19.* The problem of low monomer conversion of allylic polymerization is well recognized in the art and is commonly believed to be resulted from the *degradative chain transfer* of allylic monomers. *See "Principles of Polymerization" by George Odian, pages 250-251 (attached).*

The combined teachings of *Guo*, *Guo et al.* and the *Aldrich* catalog provide no hint that the process of the present invention would have any chance of success to achieve a monomer conversion greater than 90%. In fact, *Guo* teaches the opposite. In *Guo*'s Example 1, allyl alcohol, methyl methacrylate and 2-ethylhexyl acrylate are polymerized; the total monomer conversion is only 67.9%. In *Guo*'s Example 2, allyl alcohol, styrene, n-butyl methacrylate and n-butyl acrylate are polymerized; the total monomer conversion is only 75.8%. In *Guo*'s Example 3, allyl alcohol, t-butyl acrylate and n-butyl acrylate are polymerized; the total monomer conversion is only 70%. In *Guo*'s Example 4, allyl monopropoxylate and methyl methacrylate are polymerized; the total monomer conversion is only 80.7%. In *Guo*'s Example 5, allyl monopropoxylate, 2-ethyl acrylate and methyl methacrylate are polymerized; the total monomer conversion is only 72.4%. These monomer conversions are well below what Applicants claim: 90% or greater.

Applicants respectfully request the Examiner withdraw the obviousness rejection under the second requirement of MPEP §2142 because the combined teachings of the references provide no reasonable expectation of success of the present invention.

(III) All Claim Limitations Must Be Taught or Suggested

To establish a *prima facie* case of obviousness, the Examiner must consider all claim limitations. MPEP §2143.03 provides that “To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).”

Two essential limitations of Applicants’ claims are ignored by the Examiner: (1) the process of the invention is conducted essentially in the absence of styrene, methyl acrylate and methyl methacrylate; and (2) the process excludes the use of allyl alcohol. These two limitations cannot be found from *Guo*, *Guo et al.*, or the *Aldrich* catalog, or any combinations thereof. Therefore, the Examiner’s obviousness rejection fails under MPEP §§2142 and 2143.03.

In fact, Applicants have provided ample evidence in the application which shows that when these conditions are met, the process achieves a high monomer conversion (90 % or greater) and otherwise, the process gives a much lower monomer conversion. For instance, the polymerization of allyl alcohol monopropoxylate and n-butyl acrylate in the absence of styrene gives an almost complete monomer conversion (Example 1: 99.5% conversion). However, the same polymerization in the presence of styrene gives only 88.8% of monomer conversion (Comparative Example 3).

Unlike the present invention, *Guo* and *Guo et al.* teach the use of styrene, methyl acrylate or methacrylate, and allyl alcohol in the process. As discussed above, the reference process gives a monomer conversion that is considerably lower than that of the present invention.

Hence, Applicants respectfully request that the Examiner withdraw the obviousness rejection because the combined teachings of the references neither teach nor suggest two essential claim limitations: (1) the process of the invention is conducted essentially in the absence of styrene, methyl acrylate and methyl methacrylate; and (2) the

process excludes the use of allyl alcohol. The Examiner's failure to consider these claim limitations makes the obviousness rejection deficient under MPEP §2143.03,

In conclusion, Applicants' claims are non-obvious. Accordingly, Applicants respectfully ask the Examiner to withdraw the rejections and to allow claims 1, 3-11, and 14-18. Applicants invite the Examiner to telephone their attorney, Mr. Shao Guo, at (610) 359-6059 if a discussion of the application might be helpful.

Respectfully submitted,
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